



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 09/923,225 | 08/06/2001 | Stephen J. Plante | A0312/7410 WRM | 8975 |
| 23628 | 7590 | 12/16/2004 | EXAMINER | |
| WOLF GREENFIELD & SACKS, PC FEDERAL RESERVE PLAZA 600 ATLANTIC AVENUE BOSTON, MA 02210-2211 | | | TORRES, JOSEPH D | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2133 | |

DATE MAILED: 12/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/923,225

Applicant(s)

PLANTE ET AL.

Examiner

Joseph D. Torres

Art Unit

2133

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 June 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) 7-17 and 19-24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 and 18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 August 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 3/26/02 to 6/17/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of Group I, claims 1-6 and 18, in the reply filed on 06/17/2004 is acknowledged. The traversal is on the ground(s) that "The claim groups are related and can most efficiently be examined in a single application. It is submitted that the searches for the four claim groups would be coextensive." This is not found persuasive because Groups II and III are directed to MAP specific elements of MAP decoders not found in claim 1 such as the calculation of forward and backward metrics and Claim 1 can be implemented in a Viterbi decoder. Group IV is directed strictly to an Add/Compare/Select computation unit that can be used in circuits not related to decoding using a Trellis structure. All of the searches for all of the groups are mutually exclusive requiring searches in distinct subclasses as well as requiring distinct word searches. Note: Group I, claims 1-6 and 18, drawn to A Method for Calculating and Selecting a State Metric at Time t_1 by Specifying Transition Metrics from Time t_0 to t_1 , Adding a Transition Metric to a State Metric at Time t_0 , Subtracting a Transition Metric from another State Metric at Time t_0 and Selecting the Maximum of the Two State Metrics for Time t_0 , classified in class 714, subclass 786. Group II, claims 7-14 and 19, drawn to A Method for Calculating α and β State Metrics at Time t_1 for A Maximum Likelihood Algorithm using an α Metric at Time t_0 and a Transition Metric from Time t_0 to t_1 to Calculate the α Metric at Time t_1 and an β Metric at Time t_2 and a Transition Metric from Time t_2 to t_1 to Calculate the β Metric at Time t_1 , classified in class 714, subclass

794. Group III, claims 15-17 and 20, drawn to A Method for Calculating a log Map Function using a Correction Factor, classified in class 714, subclass 794. Group V, claims 21-24, drawn to An Accelerator with First and Second Carry Save Adders, First and Second Full Adders and a Look-up Table, classified in class 714, subclass 459.

The requirement is still deemed proper and is therefore made FINAL.

Claims 7-17 and 19-24 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected inventions, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 06/17/2004.

Drawings

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: '70', '72', '74', '76' & '78' in Figure 7. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of

any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawings are objected to because of handwriting in various drawings. Applicant is advised to employ the services of a competent patent draftsman outside the Office, as the U.S. Patent and Trademark Office no longer prepares new drawings. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-6 and 18 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Nowhere in the application does the Applicant teach “a trellis instruction that specifies **locations** of trellis state metrics” [Emphasis Added].

Claim 18 substantially recites the same language as in claim 1.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-6 and 18 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. Claim 1 recites, “A method for calculating metrics of a trellis function in a digital signal processor”. The omitted structural cooperative relationships are: the relationship between the “digital signal processor” and a “method for calculating metrics of a trellis function”. The Examiner asserts that it is not clear whether the “digital signal processor” solely provides a mechanism for carrying out the “method for calculating

Art Unit: 2133

metrics of a trellis function” or whether the “method for calculating metrics of a trellis function” is used for carrying out some useful function or process for the “digital signal processor”.

Claim 18 recites,

A processor comprising

 a program sequencer, and

 computation block with

 a register file and

 an accelerator comprising

 two adders

 a comparator and

 a data selector.

The Examiner asserts that the computation block comprises a data structure with an accelerator function which can be implemented in software as program for carrying out an Add/Compare/Select function (Note: the accelerator block is substantially and Add/Compare/Select block) for carrying out the method of claim 1. The omitted structural cooperative relationships are: the relationship between the “processor” and a “method for calculating metrics of a trellis function”. The Examiner asserts that it is not clear whether the “processor” solely provides a mechanism for carrying out the “method for calculating metrics of a trellis function” or whether the “method for calculating metrics of a trellis function” is used for carrying out some useful function or process for the

“digital signal processor”. That is, there is no link between the processor/method of claim 18 and any useful device or process.

Claim 1 recites, “for each selected trellis state, comparing the corresponding first and second values”, which is indefinite since it is not clear what “corresponding” refers to, i.e., does it refer to a correspondence between the first and second values or does it refer to a correspondence between first and second values and selected trellis states? In addition, “the corresponding first and second values” lacks antecedent basis.

Claim 18 recites, “a comparator for determining the maximum of the corresponding first and second values for each trellis state”, which is indefinite since it is not clear what “corresponding” refers to, i.e., does it refer to a correspondence between the first and second values or does it refer to a correspondence between first and second values and each trellis states?

Claims 1-6 and 18 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted structural cooperative relationships are: the relationship between the “digital signal processor” and a “method for calculating metrics of a trellis function”. The Examiner asserts that a trellis is a model of a state diagram and is a timewise description describing possible paths of the state machine. The omitted elements are: any relationship between the state machine and any useful utility or process (Note: not all state machines produce useful work or are tied to a useful process, for example; a catastrophic convolutional encoder is a state machine

Art Unit: 2133

but cannot provide any useful work). Performing or carrying out the method of claim 1 on a “digital signal processor” does not remedy the situation (since it is not clear how the method provides any tangible utility, it is just an algorithm for making various mathematical calculations not tied to any useful utility) because even if the method is carried out on the “digital signal processor”, the method still does not necessarily provide any useful utility.

Claim 18 recites,

A processor comprising

- a program sequencer, and

- computation block with

- a register file and

- an accelerator comprising

- two adders

- a comparator and

- a data selector.

The Examiner asserts that the computation block comprises a data structure with an accelerator function which can be implemented in software as program for carrying out an Add/Compare/Select function (Note: the accelerator block is substantially and Add/Compare/Select block) for carrying out the method of claim 1.

The omitted structural cooperative relationships are: the relationship between the “processor” and a “method for calculating metrics of a trellis function”. The Examiner asserts that a trellis is a model of a state diagram and is a timewise description

describing possible paths of the state machine. The omitted elements are: any relationship between the state machine and any useful utility or process (Note: not all state machines produce useful work or are tied to a useful process, for example; a catastrophic convolutional encoder is a state machine but cannot provide any useful work). Performing or carrying out the method of claim 18 on a “processor” does not remedy the situation (since it is not clear how the method provides any tangible utility, it is just an algorithm for making various mathematical calculations not tied to any useful utility) because even if the method is carried out on the “processor”, the method still does not necessarily provide any useful utility.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-6 are rejected under 35 U.S.C. 101 because the claimed invention lacks patentable utility. Claim 1 provides method for using computer program instructions to calculate mathematical quantities associated with a state diagram for a state machine (Note: computer programs and mathematical equations, calculations and formulas are non-statutory). Not all state machines produce useful work or are tied to a useful process, for example; a catastrophic convolutional encoder is a state machine but cannot provide any useful work. Performing or carrying out the method of claim 1 on a “digital signal processor” does not remedy the situation (since it is not clear how the method provides any tangible utility, it is just an algorithm for making various

mathematical calculations not tied to any useful utility) because even if the method is carried out on the "digital signal processor", the method still does not necessarily provide any useful utility. Note: any processor is capable of executing program instructions; hence claiming a processor to execute a computer program does not change the non-statutory nature of the computer program.

Claim 18 recites a processor for executing the method of claim 1 and does not necessarily provide any useful utility as pointed out, above.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Amon; Yossi et al. (US 5742621 A, hereafter referred to as Amon).

35 U.S.C. 102(b) rejection of claims 1 and 18.

Amon teaches a processor (Figure 1 in Amon is a processor) comprising: a memory for storing instructions and operands for digital signal computations (see Program RAM and Instruction Cache 30 in Figure 1 of Amon); a program sequencer for generating instruction addresses for fetching selected ones of said instructions from said memory (DRAM and SRAM Bus Interface and Instruction Cache Control 42 of Amon); and a

computation block (data arithmetic unit ALU 54 in Figures 1 and 2) comprising a register file for temporary storage of operands and results (Register File in Figure 2 of Amon) and an accelerator (Figure 3 in Amon is an algorithm for carrying out Add/Compare/Select functions in ALU 54 of Figures 1 and 2; hence is an accelerator) for executing a trellis instruction that specifies locations of trellis state metrics for a time t_0 and transition metrics from time t_0 to time t_1 , said accelerator comprising an adder for adding a transition metric to a first state metric for time t_0 to provide a first value (Step 109 in Figure 3 of Amon is an adder for adding a transition metric to a first state metric for time t_0 to provide a first value) and an adder for subtracting the transition metric from a second state metric for time t_0 to provide a second value (Step 108 in Figure 3 of Amon is an adder for subtracting the transition metric from a second state metric for time t_0 to provide a second value), a comparator for determining the maximum of the corresponding first and second values for each trellis state (Step 110 in Figure 3 of Amon a comparator for determining the maximum of the corresponding first and second values for each trellis state) and a data selector for selecting the maximum of the corresponding first and second values for selected trellis states (Step 111 in Figure 3 of Amon is a data selector for selecting the maximum of the corresponding first and second values for selected trellis states).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2133

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 2-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amon; Yossi et al. (US 5742621 A, hereafter referred to as Amon) in view of Benedetto et al. (S. Benedetto, D. Divsalar, G. Montorsi, and F. Pollara; Soft-Output Decoding Algorithms in Iterative Decoding of Turbo Codes; TDA Progress Report 42-124, February 15, 1996; hereafter referred to as Benedetto).

35 U.S.C. 103(a) rejection of claims 2-6.

Amon substantially teaches the claimed invention described in claims 1 and 18 (as rejected above).

However Amon does not explicitly teach the specific use of a MAP decoder typically used in turbo decoding (Note: all of the elements in claims 2-6 are elements of MAP decoders for turbo decoders).

Benedetto, in an analogous art, teaches a MAP decoder typically used in turbo decoding. Note: MAP decoders require the use of Add/Compare/Select functions as

taught in the appendix of Benedetto. One of ordinary skill in the art at the time the invention was made would have been highly motivated to use the Add/Compare/Select function as taught in Amon since as Amon teaches in the Abstract of Amon, the Add/Compare/Select function as taught in Amon reduces the number of clock cycles required for decoding hence accelerates the decoder.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Benedetto with the teachings of Amon by including use of the Add/Compare/Select function as taught in Amon with the MAP decoder taught in Benedetto. This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that use of the Add/Compare/Select function as taught in Amon with the MAP decoder taught in Benedetto would have provided the opportunity to reduce the number of clock cycles required for decoding hence accelerating the decoder (see Abstract of Amon).

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph D. Torres whose telephone number is (571) 272-3829. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert Decady can be reached on (571) 272-3819. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2133

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Joseph D. Torres, PhD
Primary Examiner
Art Unit 2133